

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

PJM Interconnection, L.L.C.)	
v.)	Docket No. EL19-58-000
PJM Interconnection, L.L.C.)	
)	
PJM Interconnection, L.L.C.)	Docket No. ER19-1486-000
)	
)	

**REQUEST FOR REHEARING OF THE
INDEPENDENT MARKET MONITOR FOR PJM**

Pursuant to Rule 713 of the Commission’s Rules and Regulations,¹ Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM² (“Market Monitor”), submits this request for rehearing of the order issued in this proceeding May 21, 2020 (“May 21st Order”).³

The May 21st Order imposes a market design change that fundamentally alters the PJM energy market by administratively increasing Locational Marginal Prices (LMP) above the competitive level. This is a dramatic and unsupported and unnecessary change to the PJM energy market that has produced competitive results for 20 years and been a model of market design for markets in the U.S. and the world. While the May 21st Order takes a key step in directing the implementation of a forward looking energy and ancillary services

¹ 18 CFR § 385.713 (2019).
² Capitalized terms used herein and not otherwise defined have the meaning used in the PJM Open Access Transmission Tariff (“OATT”), the PJM Operating Agreement (“OA”) or the PJM Reliability Assurance Agreement (“RAA”).
³ *PJM Interconnection, L.L.C.*, 171 FERC ¶ 61,153.

revenue offset in the capacity market, the order does not follow its own logic and leaves in place a maximum capacity market price. The combined result of the changes to the energy and capacity markets will be prices in excess of competitive levels. The purpose of competitive wholesale power markets is to provide power at the lowest possible price.

Even if the May 21st Order were to be adopted, key issues with PJM price formation mean that PJM should be required to modify its systems prior to implementing the ORDC. Failure to do so will lead to inefficient and noncompetitive results.

I. STATEMENT OF ISSUES AND SPECIFICATION OF ERRORS

In accordance with Rule 713(c)(2) of the Commission's Rules of Practice and Procedure, the Market Monitor submits the following statement of the issues and specification of the errors on which it seeks rehearing. Ample precedent supports reversal of the May 21st Order. The May 21st Order is arbitrary and fails to consider important aspects of the problem at issue.⁴ The May 21st Order is not supported by substantial evidence.⁵ The May 21st Order cannot be sustained because it lacks an "articulated []

⁴ See 5 U.S.C. § 706(2)(A); *Pac. Coast Fed'n of Fishermen's Ass'ns, Inc. v. Nat'l Marine Fisheries Serv.*, 265 F.3d 1028, 1034 (9th Cir. 2001) ("[An agency action is arbitrary and capricious if the agency has:] relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.) (quoting *Motor Vehicle Mfrs. Ass'n v. State Farm*, 463 U.S. 29, 43, (1983)).

⁵ See 5 USC § 706(2)(E) ("The reviewing court shall ... hold unlawful and set aside ... findings ... found to be ... unsupported by substantial evidence"); *Motor Vehicle Mfrs. Ass'n. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (quoting *Burlington Truck Lines, Inc. v. U.S.*, 371 U.S. 156, 168 (1962) ("Nevertheless, the agency must examine the relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'")); *Illinois Commerce Comm'n*, 576 F.3d 470, 477 (7th Cir. 2009) (explaining that a reviewing court cannot "uphold a regulatory decision that is not supported by substantial evidence on the record as a whole"); *Pacific Gas & Elec. Co. v. FERC*, 373 F.3d 1315, 1319 (D.C. Cir. 2004); *Missouri Pub. Serv. Comm'n v. FERC*, 337 F.3d 1066, 1072-75 (D.C. Cir. 2003) (vacating and remanding Commission orders because it found, among other things, that the Commission had failed to articulate the actual reasons for its decision, and the reasons it did cite were "speculative,"

rational connection between the facts found and the conclusions made."⁶ The May 21st Order fails to explain its departure from reliance on competition to ensure just and reasonable prices.⁷ An agency must explain changes in course.⁸ The May 21st Order fails to address record evidence and arguments that contradict its findings.⁹

unsupported by record evidence, and did not support its decision); *Dickinson v. Zurko*, 527 U.S. 150, 162 (1999).

⁶ *Pac. Coast Fed'n of Fishermen's Ass'ns*, 426 F.3d at 1090.

⁷ *See, e.g., Regional Transmission Organizations*, Order No. 2000, FERC Stats. & Regs. ¶31,089, *mimeo* at 144–145324 (1999); *Louisville Gas & Electric Company*, 62 FERC ¶61,016 at 61,143–44 (1993); *Louisiana Energy and Power Authority v. FERC*, 141 F.3d 364 (D.C. Cir. 1998).

⁸ *See, e.g., Nw. Env'tl. Def. Ctr. v. Bonneville Power Admin.*, 477 F.3d 668, 687–88 (9th Cir. 2007) (“[A]n agency changing its course must supply a reasoned analysis indicating that prior policies and standards are being deliberately changed, not casually ignored, and if an agency glosses over or swerves from prior precedents without discussion it may cross the line from the tolerably terse to the intolerably mute.”) (internal quotation marks and citation omitted); *Atchison, Topeka & Santa Fe Ry. v. Wichita Bd. of Trade*, 412 U.S. 800, 808, 93 S.Ct. 2367, 37 L.Ed.2d 350 (1973) (“Atchison”) (“Whatever the ground for the [agency's] departure from prior norms, . . . it must be clearly set forth so that the reviewing court may understand the basis of the agency's action and so may judge the consistency of that action with the agency's mandate.”); *Ill. Commerce Comm'n v. FERC*, 576 F.3d 470, 477 (7th Cir. 2009) (explaining that a reviewing court cannot “uphold a regulatory decision that is not supported by substantial evidence on the record as a whole”); *Ass'n of Oil Pipelines v. FERC*, 83 F.3d 1424, 1431 (D.C. Cir. 1996) (the Commission's orders must articulate “a rational connection between the facts found and the choice made”) (citations omitted); *Ne. Util. Serv. Co. v. FERC*, 993 F.2d 937, 944 (1st Cir. 1993) (reasoned decision making requires “a reasoned explanation supported by a stated connection between the facts found and the choice made”) (citation omitted).

⁹ *See* 5 USC § 557(c) (the Commission is charged with addressing “all the material issues of fact, law, or discretion presented on the record”); 5 U.S.C. § 706(2)(A); *Genuine Parts Co. v. EPA*, 890 F.3d 304, 312 (D.C. Cir. 2018) (“[A]n agency cannot ignore evidence that undercuts its judgment; and it may not minimize such evidence without adequate explanation.”); *Lakeland Bus Lines, Inc. v. NLRB*, 347 F.3d 955, 962 (D.C. Cir. 2003) (explaining that a court “may not find substantial evidence ‘merely on the basis of evidence which in and of itself justified [the agency's conclusion], without taking into account contradictory evidence or evidence from which conflicting inferences could be drawn’”) (quoting *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 487 (1951)).

Section 206 of the Federal Power Act requires a finding that the existing rule is unjust and unreasonable before it can determine a replacement rule.¹⁰ The May 21st Order explicitly does not find the PJM energy market unjust and unreasonable, but, nevertheless, imposes a market design change that fundamentally alters the PJM energy market by administratively increasing Locational Marginal Prices (LMP) above the competitive level and creates undue preferences for uneconomic resources.¹¹ The finding that energy prices set at competitive levels are unjust and unreasonable contradicts the Commission's longstanding policies for regulation through competition, which relies on competition to set prices at just and reasonable levels.¹²

By replacing competition with administratively determined prices, the replacement rules create undue preferences for uneconomic resources. The Federal Power Act does not permit rates that are "unduly discriminatory or preferential."¹³

The May 21st Order errs in finding the existing PJM reserve markets unjust and unreasonable. Such finding has no basis in logic, is arbitrary and capricious, contradicts the goals of the Federal Power Act, is unsupported by record evidence and is contradicted by record evidence.

The May 21st Order finds that PJM operators take out of market actions to procure reserves without evidence demonstrating the frequency of out of market actions or their results.

The May 21st Order errs in finding that uplift indicates that prices do not reflect the marginal cost of reserves without examining the causes of uplift. The finding is arbitrary and unsupported.

¹⁰ See 16 U.S.C. § 824e.

¹¹ See *id.*

¹² See *Federal Power Comm'n v. Sierra Pac. Power Co.*, 350 U.S. 348, 355 (1956).

¹³ See 16 U.S.C. § 824e(a); see also 16 U.S.C § 824d(b).

The May 21st Order errs in finding the proposed extended Operating Demand Curve (ORDC) to be a just and reasonable replacement rate. The finding is arbitrary and unsupported.

The May 21st Order arbitrarily accepts a \$2,000 per MWh reserve penalty price as the basis for the ORDC for market periods when market offers above \$1,000 per MWh are not possible.

The May 21st Order errs in accepting rules that cannot correct the asserted problem. Specifically, the May 21st Order accepts load, wind, and solar forecast error as a proxy for the quantity of reserves required to operator the PJM system reliably.

The May 21st Order errs in accepting new uplift payments that depend on resources accurately following dispatch signals for energy and reserves while ignoring evidence that PJM cannot accurately determine when a resource is following dispatch.

The May 21st Order errs in accepting use of gross CONE rather than net CONE as the maximum price in the capacity market, given the adoption of the forward looking E&AS offset, and as a result the May 21st Order contradicts its own fundamental logic and artificially sustains a capacity market price above the competitive level.

In addition, there is new evidence, unavailable to the Commission when the record supporting the May 21st Order was complete, demonstrating: (i) that PJM cannot accurately calculate reserves without improving generator modeling; (ii) that the timing of PJM energy and reserve pricing does not match the timing of dispatch instructions and will not match the timing of dispatch instructions under changes proposed by PJM; (iii) that changes to the timing of RT SCED case execution reduces the duration of real-time uncertainty such that the extended ORDC calculation method is incorrect; and (iv) that the proposed ORDC does not address the causes of energy and reserve market uplift. This evidence contradicts the rationales for the findings asserted in the May 21st Order, provides reasons for the

Commission to condition implementation on significant changes in PJM's operations and calculations, and are cause to grant rehearing.¹⁴

II. REQUEST FOR REHEARING

A. The May 21st Order Imposes a Fundamental Change to LMP Without a Finding that Existing PJM LMP is Unjust and Unreasonable.

1. The May 21st Order Does Not Meet the Standards Required Under Section 206 of the Federal Power Act.

PJM proposed fundamental changes to the energy market in the March 29th Filing, which is a complaint filed under Section 206 of the Federal Power Act.¹⁵ The standards applicable to Section 205 filings do not apply in this case.¹⁶ Before requested changes can be approved, the energy market design must be found unjust and unreasonable. The May 21st Order fails to make this key finding. The May 21st Order includes no finding that longstanding PJM rules establishing the pricing of energy based on locational marginal cost (locational marginal pricing or LMP) are unjust and unreasonable. Such a finding would have required an extensive explanation. Such a finding would constitute an abrupt departure from the fundamental principles that are the basis of regulation through competition and thus relied on to ensure just and reasonable rates. Without a finding that PJM's energy market rules are unjust and unreasonable, Section 206 provides no basis for replacing them. The May 21st Order does not properly apply Section 206 of the Federal Power Act.

¹⁴ See, e.g., *ANR Pipeline Company*, 109 FERC ¶ 61,038, 61153 (2004).

¹⁵ 16 U.S.C. § 824e.

¹⁶ 16 U.S.C. § 824d.

2. The Primary Result of the May 21st Order is to Increase LMP Above Competitive Levels.

The primary result of the May 21st Order is to increase energy market prices (LMP) above the competitive level by an amount up to \$12,000 per MWh based on an administrative pricing schedule, the extended sloping ORDC. The extended sloping ORDC imposes scarcity pricing when no scarcity exists and, when scarcity exists, increases prices above the level required to reflect shortage conditions. The May 21st Order correctly states (at P 319) that the order constitutes “a fundamental, extensive change to the energy and ancillary services markets.” Yet, the May 21st Order never finds a fundamental, extensive problem with the PJM energy market or with LMP. Even if the record did show that LMP did not result in the level of profits desired by some sellers for some resources, that is not a valid basis for finding LMP unjust and unreasonable.¹⁷

3. The May 21st Order’s Refusal to Rely on Competition Departs From Longstanding Policy Without Explanation.

The May 21st Order departs, without explanation, from the Commission’s longstanding policy of relying on competition to ensure just and reasonable prices.¹⁸ The

¹⁷ See *Federal Power Comm’n v. Sierra Pac. Power Co.*, 350 U.S. 348, 355 (1956) (“That the purpose of the power given the Commission by § 206 (a) is the protection of the public interest, as distinguished from the private interests of the utilities, is evidenced by the recital in § 201 of the Act that the scheme of regulation imposed “is necessary in the public interest.” When § 206 (a) is read in the light of this purpose, it is clear that a contract may not be said to be either “unjust” or “unreasonable” simply because it is unprofitable to the public utility.”).

¹⁸ See *Regional Transmission Organizations*, Order No. 2000, FERC Stats. & Regs. ¶31,089, *mimeo* at 144–145324 (1999) (“Order No. 2000”) (“The Commission has a responsibility under FPA sections 205 and 206 to ensure that rates for wholesale power sales are just and reasonable, and has found that market-based rates can be just and reasonable where the seller has no market power. The Commission has determined that to show a lack of market power, the seller and its affiliates must not have, or must have adequately mitigated, market power in the generation and transmission of electric energy, and cannot erect other barriers to entry by potential competitors” (citing *Heartland Energy Services, Inc.*, 68 FERC ¶61,233 at 62,060 (1994); *Louisville Gas & Electric Company*, 62 FERC ¶61,016 at 61,143-44 (1993); *Louisiana Energy and Power Authority v. FERC*, 141 F.3d 364 (D.C. Cir. 1998) (court upholds Commission’s use of market-based rate authority)).), *order on reh’g*, Order No.

PJM energy market has long relied upon locational marginal pricing (LMP) to ensure just and reasonable energy prices. LMP is solidly based in economic theory and has become the bedrock for the design of the organized wholesale power markets in the U.S. Since its adoption by PJM in 1999, LMP has been included in the market design of every other Commission regulated RTO/ISO. It is a defining achievement of the Commission's electric industry restructuring initiative, now nearly two decades old. The relationship between marginal cost pricing and competition is firmly established, and it has been repeatedly endorsed by the Commission in prior orders.¹⁹

2000-A, FERC Stats. & Regs. ¶31,092 (2000), *aff'd sub nom. Pub. Util. Dist. No. 1 of Snohomish County, Washington v. FERC*, 272 F.3d 607 (D.C. Cir. 2001).

¹⁹ See, e.g., *Offer Caps in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 831, 157 FERC ¶ 61,115 at P 5 (November 17, 2016) ("In the short run, LMPs that reflect the short-run marginal costs of production are particularly important during high price periods because they provide a signal to consumers to reduce consumption and a signal to suppliers to increase production or to offer new supplies to the market. In the long run, LMPs that reflect the short-run marginal cost of production are important because they inform investment decisions. Second, the reforms will give resources the opportunity to recover their short-run marginal costs, thereby encouraging resources to participate in RTO/ISO energy markets. Adequate investment in resources and resource participation in RTO/ISO energy markets ensure adequate and reliable energy for consumers. The benefits summarized above and discussed in detail below would ultimately help to ensure just and reasonable rates."); *PJM Interconnection, L.L.C.*, 110 FERC ¶ 61,053 at P 25 (2005) ("Under PJM's LMP pricing system, all generators that lack market power have an incentive to submit bids at their marginal costs, because any price above marginal cost will generate sufficient revenue to cover the unit's operating costs and contribute to the recovery of the unit's fixed costs.[footnote omitted] This is the same incentive that exists in a competitive market, where competitors are expected to produce at the point where prices exceed their short-run marginal costs. When a unit bids above its marginal cost, that is evidence that the unit has some ability to control price, and hence, has market power. This principle has been used by PJM to determine those generators subject to mitigation."); see also "Staff Analysis of Energy Offer Mitigation in RTO and ISO Markets," Price Formation in Organized Electricity Markets, Docket No. AD14-14 (October 2014) at 3 ("The mitigation procedures in the RTO and ISO energy markets, as set forth in the Commission-jurisdictional tariffs, are based on the premise that in a competitive wholesale electricity market, a resource's offer will be approximately equal to its short run marginal cost (including opportunity costs).").

Yet, based on an unsupported assertion that prevailing energy prices are too low (at PP 74, 153), the May 21st Order suddenly discards marginal cost pricing and replaces it with an administrative valuation of reserves lacking theoretical support.

4. The May 21st Order Is a Discriminatory Response to Efforts to Retain Uneconomic Baseload Resources.

The May 21st Order fails to acknowledge that the market changes were submitted by PJM in significant part based on assertions made as early as 2017 that PJM prices were too low and that PJM prices needed to be increased to prevent the economic retirement of inefficient baseload nuclear and coal-fired generators.²⁰ To address the assertions, PJM initiated the Energy Price Formation Senior Task Force, seeking market design changes that would increase revenues to what was described as baseload generation, through the energy market. PJM explained how it intended to effectuate these goals and requested that the Commission issue a compliance order requiring PJM to pursue these goals, in its comments (March 9th 2018 Filing) in response to the Commission's Notice of Proposed Rule Making initiated by the Department of Energy to provide additional payments to nuclear and coal-fired generators.²¹ The Commission declined to adopt PJM's approach. The March 29th Filing repeated much of the substance of the March 9, 2018 Filing. The May 21st Order approves it. The May 21st Order relies on the arguments of generation owners that an

²⁰ See PJM Interconnection, LLC, *Proposed Enhancements to Energy Price Formation*, November 15, 2017, <<https://wired.pjm.com/~media/library/reports-notice/special-reports/20171115-proposed-enhancements-to-energy-price-formation.ashx?la=en>>, and PJM Interconnection, LLC, *Energy Price Formation and Valuing Flexibility*, June 15, 2017, <<https://www.pjm.com/~media/library/reports-notice/special-reports/20170615-energy-market-price-formation.ashx>>.

²¹ Comments and Responses of PJM Interconnection, LLC, Grid Resilience in Regional Transmission Organizations and Independent System Operators, Docket No. AD18-7 (March 9, 2018) at 75–80.

extended sloping ORDC is an appropriate mechanism to secure higher energy market revenues.²²

PJM energy prices are and have been competitive. The problem with the push to raise PJM energy prices is that PJM energy prices were not too low when it began and are not too low now. Low fuel prices, the continued entry of highly efficient gas-fired combined cycle plants, ample excess capacity, and relatively low load growth define the supply and demand fundamentals that resulted, in 2016 and then 2019, in the lowest energy prices in PJM history, determined by competitive market forces. But market prices go up and down. In 2018, energy prices were 31.2 percent higher than in 2016, in significant part as a result of higher fuel costs and higher demand. Competitive energy markets work and energy market prices reflect the economic fundamentals. The idea that these market outcomes require a remedy is entirely unsupported. The idea that competitive energy markets need a major makeover is unsupported. It is basic economics that low prices will result in inefficient suppliers leaving the market.

5. Imposing Cost Increases on Consumers Without Justification Contradicts the Goals of the Federal Power Act.

The Federal Power Act is a consumer protection statute.²³ Its purpose is to ensure that customers pay just and reasonable prices for energy. The complaints of certain

²² See May 21st Order at P 131, referencing comments from the Energy Trading Institute; FirstEnergy Solutions Corp.; PJM Power Providers Group; Dominion Energy Services Company, Inc.; Electric Power Supply Association; PSEG Companies (PSEG Power LLC; PSEG Energy Resources & Trading LLC, Public Service Electric and Gas Company); Vistra Energy Corp. and Dynegy Marketing and Trade, LLC; May 21st Order at P 153 (“We agree with PJM and commenters that because generation resources can submit verified cost-based incremental energy offers up to \$2,000/MWh, resources capable of providing reserves will more frequently face opportunity costs as high as \$2,000/MWh. It is therefore appropriate that the Reserve Penalty Factor be revised to allow PJM to procure reserves from resources with such an opportunity cost, and that this action is captured in the market price.”).

²³ See *Xcel Energy Servs. v. FERC*, 815 F.3d 947, 952–953 (2016) (“It is long-established that the ‘primary aim [of the FPA] is the protection of consumers from excessive rates and charges,’” citing

suppliers that prices they receive in competitive markets are too low do not provide a rationale consistent with the purposes of the Federal Power Act. Consumers are not protected when rules are included in the market design in order to artificially raise prices. The May 21st Order operates to insulate suppliers from the very market forces that are relied upon to protect consumers. That is inconsistent with the requirements of the Federal Power Act.

6. The Capacity Market Offset Does Not Remedy the Departure from Competitive Pricing Created by the May 21st Order.

By creating an arbitrary administrative adder to competitively determined energy prices, the May 21st Order undermines the fundamentals of PJM's competitive energy markets. The requirement to establish a forward-looking energy and ancillary services offset in the capacity market is appropriate but does not address the noncompetitive outcome of the ORDC and does not simply shift revenues from the capacity market to the energy market. There would have been much less generator support for ORDC if it simply shifted a defined level of revenue from the capacity market to the energy market. The May 21st Order retains gross CONE as the maximum capacity market price rather than reinstating net CONE as the maximum capacity market price. The result is to artificially raise capacity market prices above the competitive level and to prevent the equilibration of the energy and capacity markets. Retaining gross CONE as the maximum capacity market price prevents, in significant part, the shift of revenues from the capacity market to the energy market. Instead the result is to increase energy market revenues without a corresponding and matching decrease in capacity market revenues. The overall result is that the combined payments by customers for energy and capacity will exceed the competitive level. In addition, any shift in revenues from the capacity market to the energy

Mun. Light Bds. of Reading & Wakefield v. FPC, 450 F.2d 1341 (D.C. Cir. 1971), *cert. denied*, 405 U.S. 989 (1972).

market, or any differential increase in energy market revenues, is not resource neutral. High capacity factor resources receive a larger share of revenue from the energy market than the capacity market. The May 21st Order does not provide reasons based in economic principles for any differential increase in revenue and the result is discriminatory.

7. The May 21st Order Fails to Address Valid Protests to its Fundamental Changes to the Energy Market.

The May 21st Order notes (at P 72) the Market Monitor's argument that PJM has not asserted LMP to be unjust and unreasonable, and the May 21st Order does not find that LMP is unjust and unreasonable. Yet the ORDC related changes to the energy market are a significant change to way in which prices are determined in the energy market. The May 21st Order approves PJM's changes to Section 2.5(b) of Schedule 1 to the PJM Operating Agreement that change the calculation of LMP such that the administratively determined ORDC price increases LMP at all times. The administrative increase in LMP is not justified in the record.

If there were a demonstrated need for additional reserves, PJM could easily increase reserves using a vertical ORDC, as in the Market Monitor's proposed ORDC alternative. The May 21st Order provides reasons, though flawed, for increasing PJM reserves, but the May 21st Order does not provide justification for the extended sloped shape of the ORDC. An extended sloped ORDC is a market design developed as an alternative to capacity markets. The May 21st Order never addresses why the adoption of such a market design is valid in PJM, given the existence of the PJM Capacity Market. Accepting rules that arbitrarily raise prices above competitive levels contradicts the commission's long standing policy to rely on competition to ensure just and reasonable rates. The May 21st Order never provides a justification for LMP that exceeds short run marginal cost.

B. The Finding that PJM's Current Reserve Markets Are Unjust and Unreasonable Has No Basis in Logic, Is Arbitrary and Capricious, Contradicts the Goals of the Federal Power Act, Is Unsupported by Record Evidence and Is Contradicted by Record Evidence.

1. The Finding that PJM Operators Take Out of Market Actions to Procure Reserves Is Not Supported in the Record.

The May 21st Order fails to show that the existing market design is unjust and unreasonable. The reason given by the May 21st Order for finding that the existing market design is not just and reasonable is that PJM operators are taking out of market actions that procure more reserves than the reserve market is clearing. The May 21st Order comes to this conclusion with no evidence of out of market actions from PJM. The only evidence that PJM provides is the asserted magnitude of load, wind, and solar forecast error and the frequency of biasing used as an input to an advisory unit commitment tool (IT SCED). PJM does not demonstrate that the forecast error data is actually relevant to any operator decisions. These data are inputs to PJM tools, and are not outputs, results, or operator actions. PJM provides no operational data showing out of market actions. The May 21st Order reaches the conclusion that the reserve market is unjust and unreasonable with no evidence supporting its reasoning.

The May 21st Order argues (at 75) that the existing PJM reserve market is unjust and unreasonable because PJM bases the reserve requirement on the single largest contingency, as required by NERC. The same basis for reserve requirements is used across North America. The May 21st Order argues (at 76 through 81) that PJM should increase its reserve requirement to also cover additional uncertainties, including wind, solar, and load forecast error, that are smaller than, and therefore covered by, the largest contingency. In addition, the calculated forecast error is based on the wrong time period and has no demonstrated effect.

The May 21st Order claims (at 80) that "PJM operators regularly need to procure thousands of additional MW of reserves," but PJM provides no evidence that its operators regularly procure thousands of additional MW of reserves or that additional reserve

procurements are necessary to maintain reliability. PJM provides information that its operators bias the load in the advisory commitment tool, IT SCED. However, PJM provides no evidence that the bias results in the procurement of reserves in excess of the reserve requirement (the Minimum Reserve Requirement or “MRR”).

Reserves in excess of the minimum requirement, when they exist, actually result from inflexible generator operating parameters that require resources to come online before their full capacity is needed and to remain online after their full capacity is needed.²⁴ The May 21st Order acknowledges these facts (at P 90), but dismisses the Market Monitor’s argument on the grounds (at P 93) that the Market Monitor does not prove that “biasing *never* results in unit commitments.” This response is illogical and not on point given that the May 21st Order is based on the argument that “PJM operators regularly need to procure thousands of additional MW of reserves.” That biasing would ever result in a unit commitment is not sufficient to support the argument that operators regularly need to and do procure thousands of additional MW of reserves. The evidence does not support this conclusion. Operators do not regularly procure thousands of MW of additional reserves.

The May 21st Order cites (at P 78) PJM’s example of operator bias from January 2019. The Market Monitor evaluated the units creating additional reserves on that day and determined that the increase in reserves was not the result of operator actions. The increase in reserves was not the result of IT SCED load bias. The additional reserves occurred when generators self-scheduled energy or came online to produce energy earlier than scheduled by PJM. The May 21st Order relies (at P 78) on the coincidental fact that the operators biased load in IT SCED, and ignores the evidence that the bias played no role in the resulting

²⁴ Protest of the Independent Market Monitor for PJM, Docket No. EL19-58 et al. (May 15, 2019) (“IMM Protest”) at 13–14 (“Coal and combined cycle gas units comprise most of PJM’s excess online capacity that is not providing energy at full output levels. Both have inflexibility in starting and shutting down, but provide a relatively large range of dispatchable capacity once online. . . . 60 percent of PJM’s energy is provided by resources that create large quantities of zero cost synchronized reserves.”).

quantity of reserves. The low prices in this case resulted from proper functioning of the market. Correlation is not causation.

The May 21st Order follows (at 81) PJM's reasoning in declaring the reserve market unjust and unreasonable because it does not place a nonzero marginal value on reserves in excess of the required level of reserves (MRR). This is equivalent to declaring the current reserve demand curve unjust and unreasonable because it does not allow for administrative shortage pricing in periods when reserves are not short. PJM reserve prices frequently equal zero because the marginal cost of those reserves is zero. If the marginal cost of meeting the current reserve requirement is positive, the reserve price will be positive. This follows basic economic logic. The Commission has also deemed this outcome to be just and reasonable across the other RTOs/ISOs.²⁵ The May 21st Order has made no findings and cited no facts that require a larger reserve requirement in PJM and provided no facts to support the claim that the PJM reserve requirement based on the largest contingency is unjust and unreasonable.

2. Record Evidence Does Not Show that PJM Needs to Carry More Reserves.

The May 21st Order goes on to point out (at 79) that PJM carries fewer reserves as a percent of its load than other RTOs. That fact does not imply that PJM should carry more reserves. With greater load, PJM also has a larger, more diverse fleet with more options available to respond to a contingency. Unlike other RTOs/ISOs, PJM has major load centers and large generators geographically dispersed throughout its footprint with varying weather and differing time zones. A loss of supply or increase in load in one part of the system is frequently offset by supply from another part of the system that is not experiencing the same events. As the Market Monitor points out, PJM's fleet responds more

²⁵ IMM Protest at 26–27.

than adequately to synchronized reserve events.²⁶ The May 21st Order argument that the magnitude of PJM's load requires additional reserves is not correct, is not based on any evidence and is not logical.

3. Record Evidence Does Not Support a Finding that Reserve Market Uplift Indicates an Unjust and Unreasonable Market, and Such Finding Is Illogical and Contradicts Other Aspects of the May 21st Order.

The May 21st Order references (at P 82) the level of reserve market uplift as evidence that reserves prices do not reflect the marginal cost of procuring reserves, referencing that uplift, rather than through the clearing price, constituted nearly half of revenues paid to Tier 2 synchronized reserves. Uplift here is not uplift in the way the term is defined in the energy market. This simply refers to the fact that the cost of synchronized reserve is significantly higher than the price of synchronized reserve, a fact that the Market Monitor has been pointing out in the State of the Market Report for years. The May 21st Order's conclusion that this data indicates that the clearing price does not reflect the marginal cost of procuring reserves is incorrect. The reason that cost is greater than price is that PJM clears the market an hour ahead based on forecast LMP and the PJM forecasts are extremely inaccurate. When actual LMPs are greater than forecast LMPs, the actual opportunity cost is greater than the estimated opportunity cost included in the synchronized reserve market clearing price. The result is that the actual cost of the reserves is higher than the hour ahead clearing price. Reserve market uplift due to PJM errors is not related to the marginal cost of procuring reserves. Furthermore, the March 29th Filing itself deems all the reserve market uplift for offline units and synchronous condensers to be invalid.²⁷ It is illogical for the May 21st Order to find the reserve markets unjust and unreasonable because these costs are not

²⁶ IMM Protest at 20–21.

²⁷ PJM Complaint, Docket No. EL19-58 et al. (March 29, 2019) at 84. (“March 29th Filing”)

covered by price in the same order that invalidates and eliminates compensation for the costs in both prices and uplift.

In the Synchronized Reserve Market, 81 percent of all uplift in 2019 was paid to synchronous condensers. These resources are paid their lost opportunity cost when they are held offline and the real-time LMP is higher than their energy offer. Much of the remaining uplift is due to the inappropriate payment of lost opportunity costs to resources that are not incurring lost opportunity costs. Other incorrect lost opportunity costs are the result of the approximately 10 minute misalignment of the reserve settlements interval, defined by the RT SCED target time, and the LPC pricing interval, defined by when the RT SCED case is approved. This issue is also unrelated to the marginal cost of procuring reserves.

In the Nonsynchronized Reserve (NSR) Market, all of the uplift paid is lost opportunity cost payments resulting from PJM clearing NSR using IT SCED prices without joint optimization with energy in RT SCED or the pricing tool, LPC. For example, if IT SCED expects prices to be \$50 per MWh, the LOC of a \$200 per MWh oil fired CT is zero. But if LPC calculates prices of \$500 per MWh, that CT is paid an LOC of \$300 per MWh. These opportunity cost payments are a result of PJM price forecasting issues and are not related to the marginal cost of procuring reserves. The March 29th Filing simply eliminates the provision for this type of compensation.²⁸

The May 21st Order (at P 83) accepts the argument that energy market uplift indicates a failure to reflect the marginal cost of procuring reserves in prices. The argument is unsupported given that PJM uplift is at all time historic lows.²⁹ The argument that energy

²⁸ *Id.*

²⁹ See Monitoring Analytics, LLC, *2019 State of the Market Report for PJM: January through March*, at Table 1-10.

market uplift indicates that prices are too low is factually incorrect. Energy prices and uplift costs are historically positively correlated.³⁰

The argument also ignores the distinction between commitment costs and marginal costs. Uplift results when inframarginal rents do not cover the cost of committing resources, but marginal costs are the cost of dispatching the marginal unit needed to meet load. LMP is based on marginal costs, not commitment costs. Efficient market design does not include commitment costs in market prices. To administratively raise prices so that more commitment costs are covered by prices does not enhance market efficiency. Energy market uplift resulting from commitment costs is not related to the marginal cost of procuring reserves, because it does not result from marginal costs.

The burden to demonstrate that a market design is unjust and unreasonable is significantly greater than the showing required in support of a Section 205 filing.³¹

C. The Finding that PJM’s Proposed Market Design Is Just and Reasonable Is Arbitrary and Capricious, Contradicts Principles Fundamental to Regulation Through Competition and Reliance on Markets, and Ignores Record Evidence Exposing Its Flaws.

1. The New Market Design Does Not Remedy the Asserted Market Design Flaw.

The May 21st Order approves a market design change that does not address the problem asserted by the order. The May 21st Order finds (at P 83) that PJM reserve market prices do not reflect the marginal cost of procuring reserves. The approved solution (at P

³⁰ See Monitoring Analytics, LLC, 2019 State of the Market Report for PJM: January through March, at Table 1-10.

³¹ March 29th Filing at 13--14, 21--22.

³¹ Cf. *Emera Maine v. FERC*, 854 F.3d 9, 27 (D.C. Cir. 2017) (“[A] bare conclusion that an existing rate is ‘unjust and unreasonable’ is nothing more than ‘a talismanic phrase that does not advance reasoned decision making,’” citing *TransCanada Power Mktg. Ltd. v. FERC*, 811 F.3d 1, 12–13 (D.C. Cir. 2015).

224) replaces the reserve market price with an administratively determined price that does not reflect the marginal cost of procuring reserves. The downward sloping operating reserve demand curve (ORDC) defines reserve prices to always equal a value on the administratively determined demand curve. As the result of the joint optimization of energy and reserves, the energy market price also increases by the administratively determined value. In replacing the competitively determined energy and reserve prices with the administratively determined ORDC prices, the May 21st Order fails to remedy its identified problem, which is that reserve prices do not reflect the marginal cost of procuring reserves.

The May 21st Order argues (at P 229) that the uncertainties modelled in PJM's extended ORDC align with out of market actions taken by PJM operators. However, PJM provides no evidence establishing a causal connection between those uncertainties and out of market actions. There is no evidence that the extended ORDC addresses the out of market actions asserted as the problem.

The May 21st Order rejects (at P 229) arguments that the ORDC values are overstated because they would overprocure reserves relative to what PJM operators have historically procured. PJM's own simulations show that, with the extended ORDCs, PJM would carry more reserves than it has historically.³² The simulations show hourly average synchronized reserves at 3,168 MW. In 2018, actual hourly synchronized reserves averaged 2,304 MW.³³ This evidence contradicts the May 21st Order's conclusion that the extended ORDC is based on operators' need to procure additional reserves. The operators did not need to procure additional reserves and did not procure additional reserves. In reaching this conclusion, the May 21st Order ignores evidence that the extended ORDC is not consistent with historic

³² March 29th Filing, Keech Affidavit, Table 4.

³³ Monitoring Analytics, LLC., *2018 State of the Market Report for PJM*, Vol. II, Section 10: Ancillary Services at Table 10-7.

operator actions, while simultaneously relying on the same operator actions to justify the extended ORDC. The conclusions are illogical and inconsistent and ignore the evidence in the record.

2. The May 21st Order Ignores Clear Evidence that the \$2,000 per MWh Reserve Penalty Rate Exceeds the Cost of Providing Reserves.

The May 21st Order ignores facts showing that a reserve penalty factor less than \$2,000 per MWh is consistent with efficient market dispatch, unlike the \$2,000 per MWh value.

The May 21st Order cites (at P 135) the Market Monitor's proposal to use the default offer cap of \$1,000 per MWh unless short run marginal costs result in legitimate offers above that cap. The short run marginal cost of resources in PJM have not exceeded \$1,000 per MWh for two years. There is no valid reason to double the cost of reserves in PJM, based on the assertion by the May 21st Order (at P 153) and by PJM that the logical, but unrealized, possibility of energy offers equal to \$2,000 per MWh justifies a \$2,000 per MWh reserve penalty factor. The May 21st Order ignores the option to let prices rise to \$2,000 per MWh when economic fundamentals dictate that outcome rather than simply setting the price at twice the supportable level.

The May 21st Order also ignores the facts, raised by the Market Monitor and cited (at P 152) by the May 21st Order, explaining the interaction between transmission constraint penalty factors and reserve penalty factors. PJM cannot reliably operate the system based on a dispatch that would place an artificially higher value on reserves than constraint relief. The transmission constraint penalty factor is \$2,000 per MWh. With the additive subzone and RTO ORDCs approved by the May 21st Order, the reserve price can exceed \$2,000 per MWh when reserves are not short and reaches at least \$4,000 per MWh when reserves in both the zone and the RTO are short. Based on the inappropriate pricing from the ORDC, the market dispatch would place a higher value on reserves than energy from a resource in the subzone. The market dispatch would therefore choose to violate a transmission constraint even though the need for reserves is satisfied.

For example, consider a situation where the market is tight and congestion prevalent, with the reserve subzone binding due to transmission constraints. The additive ORDCs in the subzone could place a \$3,000 per MWh value on reserves when the MRR is satisfied. The transmission constraint penalty factor places a \$2,000 per MWh value on maintaining the flows on the transmission line below the limit. A resource in the subzone is required to increase output to resolve the transmission constraint. The same resource may be able to provide synchronized reserves, and the extended ORDCs would value those reserves at \$3,000 per MWh. Faced with the choice to back down the resource to provide reserves or to use the resource's full energy to relieve the transmission constraint, the market would dispatch the resource down for reserves while violating the transmission constraint. Ongoing violation of a transmission constraint is a reliability problem. Providing extra reserves when the need for reserves is fully satisfied is not necessary for reliability. PJM cannot operate the system reliably under this outcome.

3. The Finding that PJM Cannot Rely on Demand Response to Provide Reserves and Can Call on Demand Response When Needed Is Illogical and Unsupported.

The May 21st Order states (at P 255) that PJM cannot rely on pre-emergency and emergency demand response resources to provide 30 minute reserves, because PJM designates them as having pre-emergency and emergency status. However, these resources have Capacity Performance obligations, and PJM can call on them by declaring an event when PJM needs them. The March 29th Filing does not define a new process for calling on 30 minute reserves. All resources clearing 30 minute reserves would be called on using the same process as under the status quo, whether that is through a reliability commitment, economic commitment, or a pre-emergency or emergency event. Nothing about the process for committing the resource changes its requirement to be available according to its submitted start and notification times, which defines the 30 minute reserve product. In fact, PJM currently allows certain emergency start thermal resources to clear in the nonsynchronized reserve market. It is discriminatory to prohibit pre-emergency and

emergency demand response from participating in the 30 minute reserve market. It is illogical to ignore a significant source of reserves that PJM customers pay for and that make up a significant share of PJM capacity resources. There was no bar in the March 29th Filing or in the May 21st Order to requiring demand response resources to be treated like other economic capacity resources, especially given the other significant changes to market design related to reserves. There is no reason to omit the role of demand response resources from this redesign. Omitting demand response resources understates the level of reserves actually available to PJM and therefore results in reserve prices in excess of the competitive level.

4. The May 21st Order Illogically Dismisses Arguments that the Criteria for Providing Secondary Reserves Are Insufficient.

The May 21st Order (at P 256) dismisses information provided by the Market Monitor explaining that resources that submit start and notification times that would allow PJM to clear them as 30 minute reserves are not consistently able to perform within 30 minutes, usually because they do not have staff on site to start the units. The May 21st Order claims that this information is irrelevant because PJM does not currently have a real-time 30 minute reserve product. While PJM may not clear a market for real-time 30 minutes reserves, PJM does track and measure 30 minute reserves. PJM does call on resources to start within the 30 minute timeframe. PJM does experience those resources failing to start because they are not staffed.³⁴ The current use of 30 minutes reserves and their ability to perform is highly relevant to the reasonableness of paying those resources for their capability to start within 30 minutes. The May 21st Order's assertion that the past inability of resources to perform after a 30 minute notification is out of scope is illogical.

³⁴ PJM has initiated a stakeholder process to address the problem that resources submit start and notification times that they cannot meet because the resource is not staffed. See PJM Issue Details: Real Time Market Values, <<https://pjm.com/committees-and-groups/issue-tracking/issue-tracking-details.aspx?Issue={29759A0E-9052-4648-80F8-C5E1E1E2DD25}>>, last accessed June 17, 2020.

5. The Failure of the May 21st Order to Fully Implement the Forward Looking E&AS Offset Is Illogical and Contradicts Other Aspects of the May 21st Order.

The May 21st Order appropriately requires the use of a forward looking energy and ancillary services (E&AS) offset in the PJM Capacity Market but fails to correspondingly and consistently allow the maximum capacity market clearing price to reflect that forward looking offset.

Under existing capacity market rules, instituted for the 2015/2016 Delivery Year, the maximum price on the VRR curve is the higher of gross CONE or 1.5 times net CONE.³⁵ The explicit reason for arbitrarily setting the maximum price at the higher of gross CONE or 1.5 times net CONE was that PJM used an historical E&AS offset in the capacity market rather than a forward looking offset at that time. The goal of using gross CONE was to prevent the capacity market price from decreasing at a time when more capacity was needed and there was no scarcity pricing mechanism in the energy market and historical energy market net revenues were higher than forward looking energy market net revenues.³⁶

But the dynamic used to justify use of gross CONE is irrelevant with the introduction of a forward looking E&S offset. The forward looking offset permits the energy and capacity markets to equilibrate as intended and removes the unintended consequences of using the historical offset. With a forward looking offset, investors face the correct market price signals from the combination of the energy and the capacity markets.

Under the May 21st Order, regardless of the increase in E&AS revenue, the maximum capacity market price would never fall below gross CONE. Gross CONE ignores

³⁵ See OATT Attachment DD § 5.10.

³⁶ PJM Interconnection, L.L.C., Docket No. ER19-105-000, "Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters," (Oct. 12, 2018).

the E&AS revenue offset by definition. That rule is inappropriate, given that the ORDC is intended to shift significant revenue from the capacity market to the energy market. If scarcity pricing based on an ORDC, regardless of its design, is going to substitute in whole or in part for the capacity market, the capacity market price must be allowed to reflect energy market net revenues. The maximum price in the capacity market should be 1.5 times net CONE and not the higher of gross CONE and 1.5 times net CONE.

The May 21st Order misunderstands the wide ranging impact of the artificially high capacity market price that results from use of gross CONE. Contrary to the May 21st Order, retention of a maximum price equal to gross CONE would affect capacity market prices regardless of the level of capacity offered, as demonstrated in the Market Monitor's May 15 filing and not only when offered capacity is less than the reserve margin.³⁷ Under the May 21st Order, the existing shape of the VRR curve would become almost vertical with the maximum price equal to gross CONE. Increases to the net energy and ancillary services offset would decrease net CONE to relatively low levels including zero. When net CONE is low or equal to zero, the capacity market price should be correspondingly low or zero. Under the May 21st Order proposal, the capacity market price would be artificially increased as a result of a rule proposed and implemented based on the historical E&AS offset.

The May 21st Order does not consistently apply its own market design logic and does not follow its decision to require a forward looking E&AS offset to its logical conclusion. The May 21st Order asserts that when E&AS revenues are high, capacity market prices need to be artificially increased through the use of gross CONE with a zero E&AS offset. If scarcity revenues in the energy market are to be a substitute for capacity market revenues, that substitution must be allowed to work. The May 21st Order fails to treat the offsetting relationship between the energy and capacity markets consistently. Customers

³⁷ IMM Protest at 68-71.

should not be required to pay significantly more for energy but fail to get the offsetting benefit in the capacity market. The May 21st Order contradicts its own fundamental logic and artificially sustains a capacity market price above the competitive level.

6. The May 21st Order Asserts Reducing Uplift as Its Rationale, but May Increase Rather than Decrease Uplift.

The May 21st Order errs in asserting that reducing uplift is a goal of the order when the order approves significant new uplift provisions for compensating differences between day-ahead and real-time reserve clearing.³⁸ The May 21st Order approves these uplift payments without providing a justification. Uplift in PJM is at record lows, constituting less than \$0.11 per MWh (0.2 percent) of the 2019 total price of energy in PJM, which was \$50.33 per MWh.³⁹ It is nearly impossible to lower PJM uplift from current levels through market design changes. The new uplift payments are based on energy and reserve prices, which will be higher with the extended ORDC. PJM's simulations show decreases in energy market uplift due to increased energy market prices under the extended ORDC. But PJM does not attempt to quantify the new uplift created. The assertion that the May 21st Order reduces uplift is unsupported.

7. The May 21st Order Ignores Evidence That PJM Does Not Accurately Measure Energy for Dispatch.

The May 21st Order ignores evidence provided by the Market Monitor that PJM cannot reliably determine whether a unit is actually following dispatch as a result of insufficient generator modelling and ramp definitions.⁴⁰ The March 2019 Filing asserts that PJM will not provide new reserve market uplift payments when resources do not follow

³⁸ March 29th Filing at 107-111.

³⁹ Monitoring Analytics, LLC, *2019 State of the Market Report for PJM: January through March*, at Table 1-10.

⁴⁰ IMM Protest at 59-60.

dispatch.⁴¹ It is not possible for PJM to implement this provision without the ability to determine if a resource is following dispatch.

D. New Evidence Exposes the Flawed Design as Unjust and Unreasonable.

1. Events in 2019 and 2020 Show that PJM Cannot Accurately Calculate Reserves Without Improving Generator Modeling.

PJM currently models generators' operation as a continuous function defined by the ramp rate. PJM sends dispatch signals to generators and PJM expects that generators will increase or decrease output as defined by their submitted ramp rates. This simplification of generators' operation as a continuous function has worked for decades within acceptable limits and subject to regular PJM operator interventions to solve issues. But the issues with this relatively crude approximation have been emerging for some time and are revealed clearly when the system is stressed. Under some common circumstances, PJM cannot accurately dispatch units for energy or calculate reserves due to its lack of accurate generator modelling, including a lack of accurate ramp rates, especially for combined cycles. These issues result in an understatement of reserves and an overstatement of available energy. Unless addressed prior to the implementation of the May 21st Filing, they will result in higher energy and reserve prices and unnecessary synchronized reserve events.

When PJM instructs generators to increase output, it sends generators a dispatch signal based on the ramp rate submitted, up to the economic maximum output level submitted. If a generator informs PJM, via the submitted ramp rate, that it can ramp 5 MW per minute, PJM can and will dispatch such generator by up to 50 MW in 10 minutes, based on the current 10 minute real-time dispatch ("RT SCED") look ahead.

The assumption of a smooth and continuous ramp rate is incorrect for combined cycle units (CCs), for coal units, and for some other unit types. Effectively 100 percent of

⁴¹ March 29th Filing at Proposed OA Schedule 1, Section 3.2.3A(f)(iii)(E).

new units added to PJM capacity since the introduction of markets in 1999 have been CCs, and CCs were marginal 62.13 percent of the time in PJM in 2019.⁴² The ramp rates of CCs are not continuous because CCs are comprised of individual CTs plus heat recovery steam generators (HRSG) plus power augmentation technologies, all of which introduce discontinuities into the actual ramp rates of CCs. When such a discontinuity in the ramp rate is reached, the unit will not ramp at 5 MW per minute. RT SCED will continue to send a dispatch signal to ramp up but the unit will not ramp up, unless the unit operator makes an operational decision to modify the operation of the plant and even then there may be a delay. This type of operation generally requires generators to stop following PJM's dispatch signal automatically and requires manual intervention from the unit operator and a decision by the unit operator based on their individual view of expected prices.

There is no uniform approach to addressing these discontinuities and deploying the additional MW. Some generators deploy the MW as soon as instructed by PJM. Some generators deploy the MW only after they are convinced that they can run at the higher level for a sustained period. Some generators wait for a direct instruction from PJM. Some generators simply do not respond to the dispatch signal.

On October 1, 2019, and February 7, 2020, PJM experienced synchronized events due to low ACE.⁴³ The Market Monitor analyzed the generator performance, prior, during and after the events. Leading up to those events, PJM requested that generators increase output. Overall, generators did not follow the PJM dispatch signals. Figure 1 and Figure 2 show the total generation in PJM before, during, and after the October 1, 2019, and February 7, 2020, low ACE events. Both figures show that PJM generation did not follow the PJM dispatch.

⁴² Monitoring Analytics, LLC, *2019 State of the Market Report for PJM*, Volume 2, Section 3: Energy Market, Table 3-52, p.167.

⁴³ ACE (Area Control Error) ACE is a measure of the imbalance between supply and demand within the RTO.

Figure 1 October 1, 2019 RT SCED Dispatch MW and Actual Generation during low ACE event.

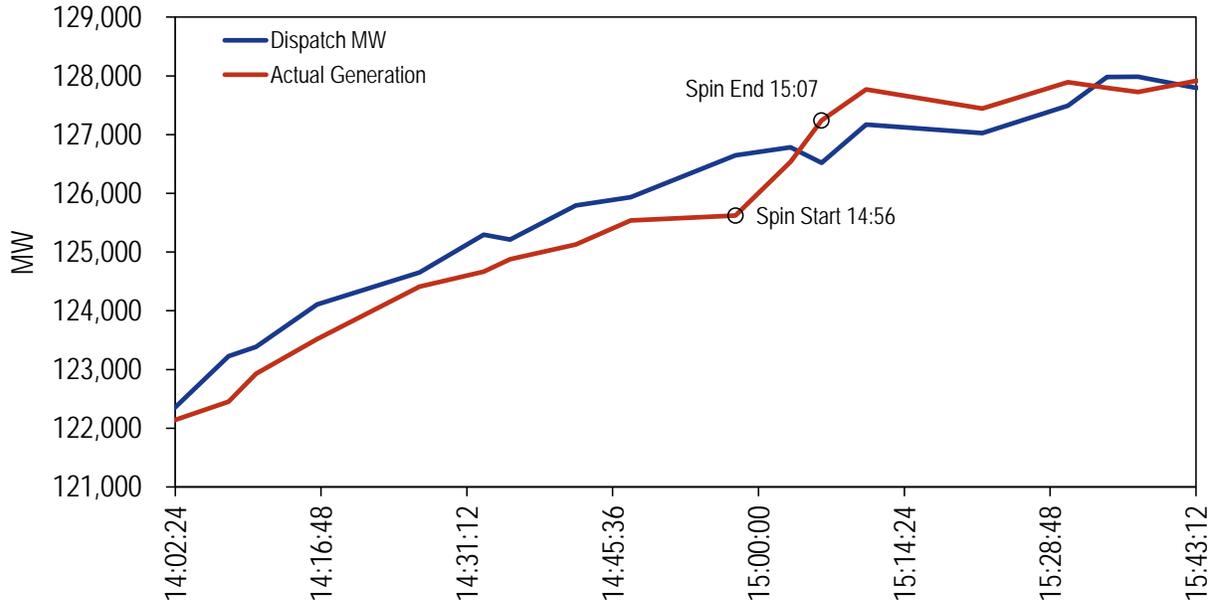
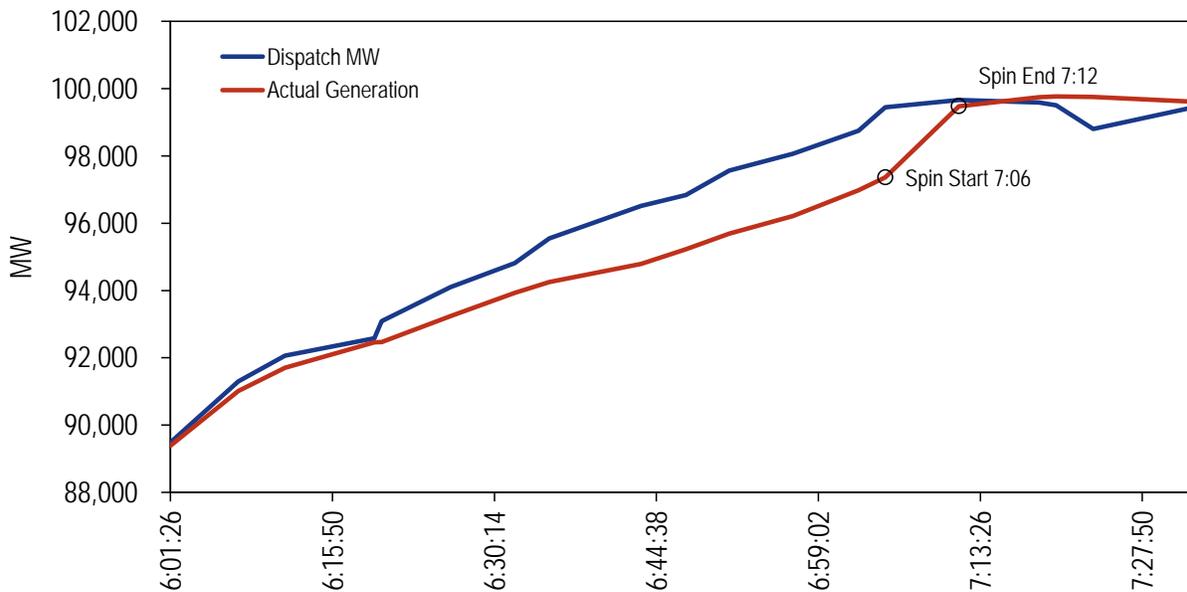


Figure 2 February 7, 2020 RT SCED Dispatch MW and Actual Generation during low ACE event.



Based on generator performance on October 1, 2019, the Market Monitor asked generators to explain why they were not able to follow the PJM dispatch signal. The responses were: input data errors (e.g. overstated economic maximum due to higher than expected temperatures and incorrect outage reporting); and inaccurate generator ramp

rates. The ramp rates were inaccurate because they did not correctly incorporate the generators actual operational discontinuities.

The same issues apply to reserves. If a generator cannot provide energy in 10 minutes as instructed by PJM, it cannot provide reserves in 10 minutes. If PJM allows generators to use the synchronized reserve maximum parameter (spin max) to withhold reserves on available capacity beyond the operational discontinuity, as PJM does under the status quo, reserves will be understated and ORDC prices will be higher.⁴⁴

The dispatch rates used by PJM are the basis for the calculation of reserves. If the dispatch rates are not correct, PJM cannot calculate reserves correctly. If the dispatch rates are not correct, PJM cannot correctly calculate the energy output it can expect from units. The result is that a spinning event can be triggered with corresponding high costs for customers under the ORDC when the energy dispatched by PJM does not show up. Or, when a unit turns on duct firing, its synchronized reserve maximum parameter will cause PJM to underestimate the level of available reserves and the generic dispatch rate will cause PJM to underestimate the energy ramp rate of the unit.

If PJM cannot correctly measure the amount of energy it has available for dispatch or the amount of reserves available, it cannot implement the extended ORDC pricing as described in its March 29, 2019 filing (“March 29th Filing”) or as described in the May 21st Order.

Lack of generator performance that causes low ACE events is a symptom of poor generator modeling. PJM is proposing to use the same simplified generator modeling it currently has to implement a systematic and probabilistic method to price reserves.

PJM has been developing, in collaboration with MISO and ISONE, a new generation of commitment and dispatch tools (nGEM) that is expected to address these issues. The tools will incorporate the ability to model combined cycle configuration transitions and

⁴⁴ See March 29th Filing at 89.

peak operation such as duct burners and other power augmentation methods, including peak firing and water injection.⁴⁵

PJM should not implement its overhaul of the energy and reserve markets until the new commitment and dispatch tools have been implemented. The new tools will allow PJM to send accurate dispatch signals to units with discontinuous ramp rates and will allow PJM to account for reserves correctly.

2. The Timing of PJM Energy and Reserve Pricing Does Not Match the Timing of Dispatch Instructions.

The May 21st Order claims (at 115) that the consolidation of the synchronized reserve market will create uniform compensation for performance and improve price formation in the reserve market. The May 21st Order claims (at 224) that the extended ORDC will align reserve market prices with the marginal cost of reserves. Neither of these claims can be met under PJM's process for dispatching and pricing in the real-time energy market. As long as PJM dispatches the system at a frequency other than five minutes and uses a 10 minute, instead of a five minute, RT SCED ramp time, the prices paid for reserves will not apply to the same interval in which those reserves are provided according to the PJM dispatch signal.

The Market Monitor raised the same issues in its response to PJM's fast start compliance filing, and the Commission held the proceeding in abeyance so that PJM could address the issues prior to implementation.⁴⁶ Similarly, the reserve market reforms and extended ORDC cannot be implemented as designed until these issues are fully resolved.

PJM currently runs RT SCED at least every four minutes and approvals are made manually by dispatchers at no routine frequency. RT SCED cases solve for forecasted load

⁴⁵ See "GE Enhanced Combined Cycle Model Design Update," PJM presentation to the Modeling Generation Senior Task Force. (April 20, 2020) <<https://pjm.com/-/media/committees-groups/task-forces/mgstf/2020/20200420/20200420-item-04-ge-enhanced-combined-model-design-update.ashx>>.

⁴⁶ *PJM Interconnection, LLC*, 170 FERC ¶ 61,018 (January 23, 2020).

at specific five minute intervals (e.g. 11:00, 11:05, 11:10, etc.). RT SCED calculates dispatch signals for the target times using a 10 minute resource ramp calculation. Any MW available within 10 minutes after the target time can be counted as synchronized reserves. PJM assigns reserves (for settlement purposes) to the five minute interval beginning at the target time using the last approved RT SCED case. LPC, the tool used to calculate energy and reserve prices, uses the latest approved RT SCED case, regardless of target time, and applies those prices to the interval period in which the LPC case solved. The dispatch target time, ramp time, and settlement interval are not aligned. This lack of consistency within RT SCED (solving at random times for specific load target times) and between RT SCED and LPC (solving a 10 minute look ahead and pricing every five minutes) results in mismatches between the energy dispatch signals, the assigned reserves and the prices of both.

A resource that follows its ramp rate is paid for reserves in an interval when it did not provide reserves. In some cases, it is not even possible for the resource to provide the reserves cleared by PJM, because PJM sends a new dispatch signal before the 10 minute ramp time is complete.

Under the May 21st Order, PJM will cap the MW of reserves at the lesser of the assigned reserve MW and the difference between real-time output and economic maximum output. With the reserves provided in a different interval than the settlement, the calculation will be incorrect. This means that some resources that clear and provide reserves will never receive compensation for providing those reserves.

Failure to compensate a resource that provides cleared reserves by following dispatch is an unacceptable outcome, inconsistent with PJM's intentions and the Commission's goals under Order No. 825 of "providing appropriate incentives for market participants to follow commitment and dispatch instructions" and compensating resources

to “reflect the value of a resource providing given services to ensure appropriate economic incentives to meet system needs.”⁴⁷

The Market Monitor raised these issues with PJM in 2018 and has been working with PJM in the stakeholder process to resolve them since 2019. Under changes proposed by PJM, resources will continue to be paid for reserves during an interval in which they did not provide reserves. PJM is proposing to assign reserves to the interval that ends at the target time, but the reserves are provided based on an earlier dispatch signal.⁴⁸ PJM’s changes will not resolve the issue. The Market Monitor has proposed changes that would fully resolve the issues by reducing the RT SCED ramp time to five minutes, and aligning the dispatch interval and the pricing interval.⁴⁹ PJM has not supported to or committed to making those changes, characterizing them as under long term evaluation.⁵⁰

3. Changes to the Timing of RT SCED Case Execution Reduces the Duration of Real-Time Uncertainty.

The May 21st Order agrees (at P 232) with PJM that the relevant period of uncertainty in the real-time dispatch is 30 minutes. The May 21st Order provides no justification for agreeing with PJM rather than the Market Monitor and ODEC on this point. The facts about

⁴⁷ Settlement Intervals and Shortage Pricing in Markets Operated by Regional Transmission Organizations and Independent System Operators, Order No. 825, 155 FERC ¶ 61,276, at P 68 and 163 (2016) (“Order No. 825”).

⁴⁸ See “PJM Package Highlights: 5 Minute Dispatch and Pricing,” PJM presentation to the Market Implementation Committee. (June 3, 2020) <<https://pjm.com/-/media/committees-groups/committees/mic/2020/20200603/20200603-item-03a1-five-minute-dispatch-and-pricing-pjm-proposal.ashx>> at 6.

⁴⁹ Monitoring Analytics, LLC, “Five Minute Dispatch and Settlements: IMM Package,” Market Monitor Presentation to the Markets Implementation Committee (June 3, 2020).

⁵⁰ See “PJM Package Highlights: 5 Minute Dispatch and Pricing,” PJM presentation to the Market Implementation Committee. (June 3, 2020) <<https://pjm.com/-/media/committees-groups/committees/mic/2020/20200603/20200603-item-03a1-five-minute-dispatch-and-pricing-pjm-proposal.ashx>> at 15-17.

how PJM dispatches the system have changed since the March 29th Filing. The math PJM used to justify the 30 minute uncertainty period is no longer correct, even under PJM's approach. The Market Monitor showed that a shorter uncertainty period would reduce prices resulting from the extended ORDC.⁵¹ The ORDC calculations approved in the May 21st Order are not correct because they do not reflect the shorter period.

Since the March 29th Filing, PJM has agreed to make changes to the frequency with which it executes RT SCED solutions. PJM plans to reduce RT SCED automatic executions from every three minutes to every five minutes. PJM made a change to four minute RT SCED executions as of February 24, 2020. Under the three minute RT SCED execution in place at the time of the March 29th Filing, the software executed from 10 to 14 minutes prior to the target time. Under five minute RT SCED execution, the software will run regularly at 10 minutes prior to the target time. With this change, PJM will eliminate the regular "deviations from when the RT SCED case is run" that PJM uses to justify extending the uncertainty time frame to 30 minutes.⁵²

With the reduced time between the RT SCED case execution and the case target time, the uncertainty will be reduced. There will be no justification for the 30 minute ORDC calculations. The relevant time frame is the RT SCED look ahead time, which is currently 10 minutes.⁵³ There is no justification for adding the 10 minute reserve deployment time. The additional time PJM rounded up do to variability in RT SCED dispatch execution will no longer be relevant when PJM dispatches the system at a five minute frequency.

⁵¹ Independent Market Monitor Protest at Attachment B, p. 24.

⁵² March 29th Filing at Rocha Garrido Affidavit, P 13.

⁵³ The RT SCED ramp time should be five minutes, for the reasons described in Section II.D.2.

III. CONCLUSION

For the reasons provided above, the Market Monitor respectfully requests that the Commission grant rehearing.

Respectfully submitted,



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Dated: June 19, 2020

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Eagleville, Pennsylvania,
this 19th day of June, 2020.



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